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ABSTRACT

This study observed the communication behavior within ad hoc and established groups and compared the two types of groups on several indexes of interaction patterns. Ad hoc groups were individuals who had no in-group activity with each other prior to the experiment. Established groups were individuals who had nine 50-minute sessions of ingroup activity with each other prior to the experiment. The subjects were 80 college students randomly divided into 16 five-member groups. At the conclusion of three weeks of group activities, 6 of the 16 groups were randomly selected to serve as the established groups for the experiment. The six ad hoc groups were systematically created from the students who were not divided into established groups. Each group participated in a videotaped decision-making discussion. Each group member was first given four choice dilemma problems, and the group was then told to discuss each problem and attempt to arrive at a consensus on each problem. The results indicated that the six established groups were not significantly different from the six ad hoc groups for feedback responses sent, person to group contributions, total contributions, receive-send ratio, selectivity ratio, and centrality index. (WR)

INTERACTION PATTERNS IN ESTABLISHED AND AD HOC GROUPS: AN EXPERIMENTAL COMPARISON

Terrence R. Radcliffe

The Problem

The Use of Ad Hoc Groups in Research

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In their review of "time" as a methodological problem, McGrath and Altman (1966) felt there was confusion among the results of many small group studies because "we so frequently use newly formed, experimentally created groups, with 'no' past history, in laboratory studies of small groups (pp. 73-74)."

McGrath and Altman felt this confusion was attributable to the fact that various experimenters have observed the impact of the same variable at different stages of group development, yet assumed that all groups studied were at the same stage of development. In other words, McGrath and Altman imply that groups with "zero" development (i.e., no history) will differ from groups with some form of development in reaction to a variable. Previous researchers, according to McGrath and Altman, have assumed that groups with no development and groups with development will react to the impact of a variable in the same manner. McGrath and Altman state

this is a weak assumption; yet if we are to achieve comparability among studies and the ability to pool information in an accumulative fashion, we must have some appreciation of the developmental stage at which a group is functioning (p. 73).

Lorge, Fox, Davitz and Brenner (1958) recognized this same methodological problem in small group experiments, but viewed the problem as one of distinguishing between "ad hoc" and "established" groups. They concluded that 1) Ad hoc and established groups are qualitatively and quantitatively different; and 2) Principles valid for ad hoc groups should not be generalized to established groups.

Despite the agreement of McGrath and Altman and of Lorge, et. al., that generalizations from experiments with ad hoc groups may have questionable validity for established groups, many group communication researchers have employed ad hoc groups in their studies, and have attempted to generalize their data to established groups (e.g., Utterback, 1964; Giffin and Ehrlich, 1963; Bavelas, Hastorf, Gross and Kite, 1965; Wallach and Kogan, 1965; Scheidel and Crowell, 1966; Berg, 1967; Bayless, 1967; Hackman, 1968; Wallach, Kogan and Burt, 1968; Miller, Butler, and McMarten, 1969; Leathers, 1969, 1970, 1972; Bostrom, 1970; Stech, 1970; Burgoon, 1971; Dion and Miller, 1971; Williams and Clark, 1971; McCrosky and Wright, 1971; Knutson, 1972; Ogawa and Welden, 1972; McCrosky, Young and Scott, 1972). The groups studied by group communication scholars were ad hoc in nature because the researchers typically used randomly assigned subjects who had no in-group experience; the subjects did not know each other well; and the subjects interacted one time only as a group for data gathering purposes. In addition, these researchers usually attempted to generalize their findings to other groups that had the possibility of being established. For example,

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McCrosky, Young and Scott (1972) generalized the data from their study to "a small group communication setting (p. 211)" while Leathers (1972) generalized the results from the ad hoc groups in his study to an industrial communication setting (p. 173). Conceivably, many small group communication settings, including many industrial communication settings, employ decision-making groups that have a history and tradition of working together.

McGrath and Altman (1966) attempted to explain the use of ad hoc groups by stating "one major justification for creating and using 'zero history' groups is that we can trace group development through time (p. 73)." Tracing the development of groups through time was not the purpose of the research just discussed. Rather, the researchers were using ad hoc groups for experimentation and attempting to build theory that would apply to groups that are established.

Two questions are evident from the previous discussion:

- 1) To what extent do ad hoc and established groups differ? and
- 2) Can data from ad hoc groups validly be generalized to established groups?

If we tentatively accept the statement by Lorge, et. al. (1958) that

the continuum...of ad hoc to traditioned groups constitutes an ambiguous and complex semantic range for interacting, face-to-face groups who deliberate to solve problems or produce joint products (p.338)

then the conclusion is that differences between ad hoc and established groups are not sufficiently clear as to warrant a definite answer to the first question at this time. Further study of differences between ad hoc and established groups is indicated.

If we accept the conclusion by McGrath and Altman (1966) and Lorge, et. al. (1958) that principles valid for ad hoc groups do not necessarily hold for established groups, then we should be cautious about generalizing from ad hoc to established groups. However, the conclusion by McGrath and Altman and Lorge, et. al. cannot be accepted as valid until empirical evidence indicates that ad hoc and established groups differ. Hence, further study of differences between ad hoc and established groups is indicated.

Review of Literature

Differences Between Ad Hoc and Established Groups

Several scholars have asserted that ad hoc and established groups differ (Lorge, Fox, Davitz and Brenner, 1958; Fox and Lorge, 1962; Gully, 1968; Bormann, 1969; Borden, Gregg and Grove, 1969; Davis, Bates and Nealy, 1971). These scholars, however, did not provide data to support their assertions, and did not specify differences in terms of any particular variable classes.

Two experiments (Torrance, 1954; Hall and Williams, 1966) attempted to delineate differences between ad hoc and established groups. Torrance reported that leaders of established groups exerted more influence on their members than did leaders of ad hoc groups. Hall and Williams reported that established groups produced more accurate decisions and handled conflict with increased creativity. In addition, Hall and Williams reported that ad hoc and established groups did not differ in terms of time spent to make a decision or in their utilization of group resources. These two studies indicated that there are differences between the two types of groups in terms of "input" and "output" variables (McGrath and Altman, 1966) but did not identify differences in terms of variables relevant to the interaction processes of the two types of groups.

More specific evidence that ad hoc and established groups differ, and how they differ, is provided by "group development" studies. These studies typically examine a group from its beginning to its end, and attempt to identify the "phases" the group went through in its development history. The first phase generally occurs during a group's first or second meeting. This phase is equivalent to the phase that groups are in that are classified in this study as ad hoc. The last phase a group exhibits generally occurs after several meetings. This last phase is equivalent to the phase that groups are in that are classified in this study as established.

Heinicke and Bales (1953) measured the interaction process and status levels of ten groups, from two different universities, who had met at least four times. They found that the groups in their initial phases (i.e., ad hoc groups) and the groups in their latter phases (i.e., established groups) differed in terms of quality and interaction, as measured by the Interaction Process Analysis Categories (Bales, 1950), and in terms of status levels associated with the categories.

Psathas (1960) studied the development of two psychotherapy groups through nine sessions. The interaction processes of these two groups, as measured by Bales' Interaction Process Analysis categories, were similar in development to the groups studied by Heinicke and Bales (1953). Data from these studies indicate that ad hoc and established groups differ in terms of the quality of their interaction within the groups.

Bennis and Sheppard (1956) postulated a theory of groups development based upon their work with graduate students in a "groups dynamics" course. These authors maintained that a group could develop from an interpersonal phase of "Dependence-Flight" (i.e. ad hoc development) to an interpersonal phase of "Interdependence-Consensual Validation" (i.e., established development).

Results from a study by Philip and Dunphy (1959) indicated that the quality of interaction by groups in their first sessions differed from the quality of interaction by the same groups during their eighth group session. Interaction quality, in this study was measured by Bales' Interaction Process Analysis categories. These results are similar to the results of Heinicke and Bales (1953) and Psathas (1960). Philip and Dunphy also recorded the total number of "acts" per session by the groups. They reported that groups emitted 1941 acts during the first session while the same groups in the eighth session emitted 2460 acts.

Leik (1965) attempted to determine if the applicability of findings for ad hoc groups of college students would hold true for established family groups. Leik used Bales' Interaction Process Analysis categories to secure his data. Using a complex mathematical formula, he attempted to mathematically predict the communication behavior from three-member ad hoc groups to three-member family groups. Because he could not accurately predict, Leik concluded that predictions from interaction with strangers will not hold for interaction with family members.

After an extensive review of the literature on the developmental phases of small groups, Tuckman (1965) theorized that groups in their first phase (i.e., ad hoc) and groups in their last phase (i.e., established) differ in terms of structure and task variables.

Lennard and Bernstein (1969) focused on the "formal and process" interaction characteristics of family groups. One of their main points of emphasis was that the interaction patterns of groups should be studied over time. Although Lennard and Bernstein were interested in studying the interaction patterns of groups through several sessions, the evidence they offered was for the interaction patterns of groups whose members had met for only one session.

Fisher (1970) provided data indicating that there are four phases of group development. He developed his own interaction process category system and studied the verbal contributions of several groups. Fisher reported differences between groups in their initial phase (i.e., ad hoc) and groups in their last phase (i.e., established) in terms of the content categories. Fisher's data also indicated that the groups in their later phase emitted fewer total contributions than in their initial phase. Fisher's findings about total contributions is in disagreement with the results reported by Philip and Dunphy (1959). Fisher's results indicating differences between groups in ad hoc and development are in concert with the results of Heinicke and Bales (1953), Philip and Dunphy (1959), Psathas (1960), Leik (1965), and Tuckman (1965).

In sum, this review indicates that ad hoc and established groups do differ in terms of several variable classes: 1) decision outcomes and conflict (Hall and Williams, 1966); 2) leadership (Torrance, 1954); 3) quality of interaction as measured by the Bales' IPA categories (Heinicke and Bales, 1953; Philip and Dunphy, 1959; Psathas, 1960; Leik, 1965); 4) interpersonal relationships (Bennis and Sheppard, 1956); 5) structure and task (Tuckman, 1965); 6) acts per session (Philip and Dunphy, 1959; Fisher, 1970); 7) formal and process characteristics (Lennard and Bernstein, 1969); and 8) content of verbal contributions (Fisher, 1970).

Interaction Process

From the above literature review it may be concluded that ad hoc and established groups have been found to differ in terms of the quality of interaction as measured by the IPA, the content of verbal contributions, and process characteristics. With the exception of the study by Philip and Dunphy (1959), the one session groups studied by Lennard and Bernstein (1969), and some incidental data reported by Psathas (1960) and Fisher (1970), the literature reported in this

review did not examine differences between ad hoc and established groups in terms of interaction "patterns." Interaction patterns reveal the "form" of the interaction and not the content or quality (Lennard and Bernstein, 1969; Bostrom, 1970).

The limited amount of evidence concerning the form of interaction in ad hoc and established groups is contradictory. Philip and Dunphy (1959) reported that groups in their initial phase (i.e., ad hoc) will emit fewer total contributions than groups in their final phase of development (i.e., established), whereas an examination of Fisher's data (1970) indicated that groups in their established phase will emit fewer total contributions.

The contradictory findings are also provided by investigations of Interaction Ranking Matrixes (Bales, Strodtbeck, Mills, and Roseborough, 1951). The Interaction Ranking Matrix is a rank ordering of different types of contributions that members of a group will emit (i.e., quantitative counts of types of contributions in rank order). An Interaction Ranking Matrix is considered to be an indication of interaction patterns within groups (Stephan, 1952; Stephan and Mishler, 1952). The Interaction Ranking Matrix found by Psathas (1960) for ad hoc laboratory groups was very similar in structure to the Interaction Ranking Matrix he found for established therapy groups. Yet the quality of interaction within these matrixes differed considerably for both types of groups (Heinicke and Bales, 1953); Psathas, 1960; Philip and Dunphy, 1959; Leik, 1965).

It appears, then, that groups in their initial phases differ from groups in their last phases in terms of the content and quality of their interaction, but it is not clear whether ad hoc and established groups differ in terms of interaction patterns (i.e., form of interaction). Hence, the present study observed the communication behavior within ad hoc and established groups and compared the two types of groups on several indices of interaction patterns.

Interaction patterns were selected for the present study as the dependent variables. These variables are part of a more general variable class entitled "interaction process" (McGrath and Altman, 1966), or "form and process" (Lennard and Bernstein, 1969). A rationale for the selection of interaction patterns follows.

Rationale for the Selection of Interaction Patterns

First, in recent years communication scholars have indicated that interaction process variables should be the major focus in group communication studies (McGrath and Altman, 1966; Scheidel and Crowell, 1966; Gouran, 1970; Bormann, 1970; Bostrom, 1970; Leathers, 1969, 1970, 1971, 1972; Fisher, 1971; Fisher and Hawes, 1971; Mortenson, 1971).

Second, all groups interact and establish patterns of interaction (Bales, 1950, 1970; Bales and Strodtbeck, 1951; Stephan, 1952; Stephan and Mishler, 1952; Collins and Guetzkow, 1964; Mills, 1967; Lennard and Bernstein, 1969; Bostrom, 1970). Thus interaction

patterns are exhibited by ad hoc and established groups and provide data for statistical comparison.

Third, previous literature indicated that ad hoc and established differ in terms of the quality of their interaction. If the interaction patterns of ad hoc and established groups also differ then the argument that data from ad hoc groups cannot be generalized to established groups is strengthened.

Definition of Variables

Types of Groups

Ad Hoc Groups were defined as those collections of individuals who had no in-group activity with each other prior to the experiment. These groups, then, were "zero" in terms of temporal development.

Established Groups were defined as those collections of individuals who had had nine 50 minute sessions of in-group activity with each other prior to the experiment. The temporal development of these groups was 7.50 hours.

Interaction Patterns

Interaction patterns have been generally defined as: who speaks to whom within the group (Bales, 1950, 1970; Stephan, 1952), the pattern of participation by group members (Stephan and Mishler, 1952), or the balance of participation by group members (Bostrom, 1970). Several researchers have studied group interaction patterns by calculating rates and indices for various types of contributions within the group (Lennard and Bernstein, 1969; Bostrom, 1970). These rates and indices were intended to define who speaks to whom and the balance of participation. For this study, six rates and indices were chosen to define interaction patterns.

1) Feedback Response Sent: This was the basic unit for analysis in this study. It was defined as a contribution by a group participant in direct response to another group member's contribution. If two judges independently agreed that a contribution was directed to another participant, and they agreed who that other participant was, then the contribution became a feedback response sent. If the two judges did not agree, the contribution was not used in further analysis (Bales, Strodbeck, Mills and Roseborough, 1951; Bostrom, 1970; Radcliffe, 1973).

2) Person to Group Contributions were defined as all contributions by group participants that were not identified by feedback responses sent, or were not disagreements between the judges (Bales, 1950, 1970; Bostrom, 1970).

3) Total Contributions were defined as the sum of feedback responses sent and person to group contributions (Bales, Strodbeck,

Mills, and Roseborough, 1951; Bales, 1950, 1970).

4) Receive-Send Feedback Ratio was defined as the feedback received divided by the sum of the feedback responses sent and person to group contributions (Bales, 1956; Bostrom, 1970). This ratio indicates the balance of participation within groups.

5) Selectivity Ratio was defined as the degree to which feedback responses sent are concentrated on a few persons or are spread out over the group (Bostrom, 1970). This ratio is arrived at by first dividing the number of other participants in the group into the total number of feedback responses sent by the group then subtracting each individual participant's feedback responses sent from this value. These values are summed and divided by the number of possible recipients of the feedback responses sent (N-1) within the group.

6) Index of Centrality was defined as the sum of the person to group and feedback responses received contributions (Bostrom, 1970). This index indicates the degree to which central participants in the group give contributions to the entire group (i.e., person to group contributions) and receive feedback responses from other participants.

The following terms were defined to facilitate understanding of the variables:

1) Feedback Response Received was defined as a contribution that a participant received directly from one other participant. The total feedback responses received by members of a group is equal to the total number of feedback responses sent (Bales, Strodtbeck, Mills, and Roseborough, 1951). The distribution of feedback responses sent and received by members of groups will vary (Bales, Strodtbeck, Mills, and Roseborough, 1951; Psathas, 1960; Bales, 1970; Bostrom, 1970).

2) Contribution was defined as a "continuous flow of language of a participant to the point at which another participant initiates a continuous flow of language (Kline, p. 282, 1970)."

3) Interaction Matrix was defined as the total contributions, person to group contributions, and feedback responses sent and received in rank order form for each group in this study. Once the total contributions for the group members are ranked, the person to group contributions, and feedback responses sent and received, fall into a corresponding rank order (Bales, Strodtbeck, Mills, and Roseborough, 1951; Bales, 1956, 1970; Stephan, 1952; Mills, 1967). The interaction matrix was used in this study for purposes of ordering the data for analysis.

Research Objectives

The research hypothesis for the study was: Groups who have had

the opportunity to organize and function in in-group activity (i.e., established groups) will demonstrate significantly different interaction patterns during a decision-making discussion than groups who have had no in-group activity (i.e., ad hoc groups).

Six null hypotheses were formulated to test research hypothesis, one null hypothesis for each interaction pattern.

Method

Subjects

Students in four undergraduate speech communication courses were selected for this study. There were a total of 80 students in the four classes. At the end of the second week of the quarter, the 80 students were randomly divided into 16 five-member groups. For the following three weeks (i.e., nine class sessions) these 16 groups remained intact and participated in group activities. At the conclusion of the three weeks of group activities, six of the 16 groups were randomly selected to serve as the established groups for the experiment.

The six ad hoc groups were systematically created from the students who were not divided into established groups. No student was assigned to an ad hoc group with another student who participated with him in earlier group activities. In addition, students who were in the same class were not assigned to the same ad hoc group.

The intent of the selection procedures was to have 6 five-member ad hoc groups and 6 five-member established groups. Because of absenteeism there were a total of 26 students in the established groups and 27 students in the ad hoc groups. Group sizes ranged from 3 to 6 members.

Video-Taping Procedures

Each group participated in a video-taped decision-making discussion within a six school day period. During each video-tape session the procedures were identical. Each group member was first given four "Choice Dilemma" problems to re-read.* The group was then told to discuss each problem and attempt to arrive at a consensus on each problem. These discussions by the six ad hoc and established groups provided the interaction pattern data for the study.

Judges

Four judges, doctoral students in a Speech Communication

*All members of all groups had previously been administered the problems in class.

department were utilized to view a play-back of the video-tape and identify feedback responses and person to group contributions. The judges were split into two separate judging groups, with the same two judges in the morning session each day, and the same two judges in the afternoon session each day. Judging procedures had been previously identified (Radcliffe, 1973) and are available from the author upon request.

There was a correlation of .71 between Judges #1 and #2 in their identification of feedback responses and person to group contributions. A correlation of .71 was also found between Judges #3 and #4 for their identification of feedback responses and person to group contributions.

Statistical Analysis

Interaction matrixes were prepared for each ad hoc group and for each established group by counting the total contributions, person to group contributions, and feedback responses by every individual in each group. The receive-send ratio, selectivity ratio, person to group sends ratio, individual receives ratio, and centrality index were calculated directly from the interaction matrixes.

The interaction pattern values for the individuals in the six established groups were compared directly with the interaction pattern values for the individuals in the six ad hoc groups. The t Test was employed to determine if the ad hoc and established groups differed statistically for the six interaction patterns ($\alpha = .05$, $df = 51$).

Since it was possible that any individual group in either of the two types of groups could have differed from any other groups, it was decided to calculate Mann-Whitney U Tests comparing each established group with each of the six ad hoc groups for the six interaction patterns. Two hundred sixteen Mann-Whitney U Tests were run to compare the individual groups (36 comparisons for each interaction pattern).

Results

The results of the t tests performed on the six interaction patterns are summarized in Table 1. The results indicated that the six established groups were not significantly different from the six ad hoc groups for the six interaction patterns: feedback responses sent, person to group contributions, total contributions, receive-send ratio, selectivity ratio, and centrality index. There was no support, then, for the research hypothesis that: Groups of individuals who have had the opportunity to organize and function in in-group activities (i.e., established groups) will demonstrate significantly different interaction patterns than groups of individuals who have had no in-group activity (i.e., ad hoc groups).

The results of the 216 Mann-Whitney U Tests are summarized

in Table 2. No significant differences were found between individual ad hoc and established groups for 201 of the Mann-Whitney U Tests. There were significant differences, however, between ad hoc and established groups on 15 of the Mann-Whitney U Tests. There were two five-member and four four-member established groups, and one three-member, one six-member, two five-member, and two four-member ad hoc groups. The only trend found in the examination of the 15 Mann-Whitney U differences concerned the one six-member ad hoc group. The six-member ad hoc group 1) differed from one four-member established group for feedback responses, person to person contributions, and total contributions; 2) differed from another four-member established group for feedback responses, total contributions, and the selectivity ratio, and 3) differed from a third four-member established group for person to group contributions. The trend does not seem to be important as there were only seven differences found (out of 36 possible) between the six member ad hoc group and the established groups. The results of the Mann-Whitney U Tests support the results of the t tests, namely that ad hoc and established groups do not differ for the six interaction patterns.

Discussion

A number of scholars have used ad hoc groups in their studies and attempted to generalize data from these groups to established groups. If ad hoc and established groups are not different then these scholars would have some justification for the use of ad hoc groups in their studies. In the event that ad hoc and established groups do differ, then principles valid for ad hoc groups would not necessarily be valid for established groups and scholars would have difficulty in justifiably generalizing data from ad hoc to established groups.

In the present study, the interaction patterns of ad hoc groups did not differ significantly from the interaction patterns of established groups. It seems reasonable to conclude, then, that interaction pattern principles valid for ad hoc groups could hold true for established groups. There is no evidence that interaction pattern data from ad hoc groups cannot validly be generalized to established groups. This interpretation indicates that the results from interaction pattern studies such as Bales, Strodtbeck, Mills, and Roseborough (1951), Stephen and Mishler (1952), and Bostrom, (1970) could possibly be valid for both ad hoc and established groups.

When the results of earlier studies (Heinicke and Bales, 1953; Torrance, 1954; Bennis and Sheppard, 1956; Philip and Dunphy, 1959; Psathas, 1960; Leik, 1965; Hall and Williams, 1966; Tuckman, 1965; Fisher, 1970) and the findings of the present study are taken together, they indicate that ad hoc and established groups could differ on several variable classes, yet be similar in terms of interaction patterns.

The question, then, of whether a researcher would be justified in generalizing data from ad hoc to established groups would depend

in large part upon the type of variable class the researcher was studying. If a researcher were studying the interaction patterns of small ad hoc groups, the present study indicates that the researcher would have some justification for generalizing the results to small established groups. If a researcher were studying some variable class other than interaction patterns in ad hoc groups, the feasibility of generalizing data from these groups to established groups remains in serious question.

Implications for Further Research

Implications for further research are discussed in light of limitations of the present study.

First, the subjects in the present study were undergraduate students. Whether the results of this study could be generalized to other populations (e.g., adult ad hoc and established groups) remains unknown. The present study needs replication with similar subjects, with subjects from other types of groups, and with more subjects. It would seem appropriate to compare established groups drawn from an organization, where these groups meet daily or weekly for decision-making, with ad hoc groups (who meet one time only for decisions) drawn from the same (or different) organization. A comparison of ad hoc and established organizational groups with established and ad hoc undergraduates would also seem appropriate. Research of this nature should indicate specifically whether data from groups of undergraduates can be generalized to the "real world" of organizations.

Second, the validity of interaction patterns, as an indicator of group interaction process, remains largely unknown. What specifically do interaction patterns indicate about a group? Bales (1950-1970) has been among the foremost proponents of interaction patterns. Yet, Bales warned in his latest book (1970) that researchers should not separate the quality of the interaction from the form of interaction (as this present study has done). A somewhat opposing view was offered by Lennard and Bernstein (1969) who placed more emphasis upon the form of interaction, yet did not ignore entirely the quality of interaction. It is suggested that ad hoc and established groups be compared on the quality of interaction and interaction patterns in the same study. An investigation of this type could determine whether 1) ad hoc and established groups differ in terms of interaction patterns and quality of interaction, and 2) whether there is a correlation between interaction patterns and quality of interaction in either one or both types of groups.

Third, before the video-taped discussion, the only observable difference between the ad hoc and established groups in the study should have been the 7.50 hours of in-group activity engaged in by the established groups. It was possible that some of the previous class experiences of the ad hoc group members could have lapped over into the video-taped discussion (i.e., a training effect) and reduced the likelihood that members of ad hoc groups were interacting with

strangers. This could explain, in part, the lack of significant differences between the two types of groups. To control for any possible "training effect" it is recommended that subsequent investigators vary the amount of group communication training the two types of groups receive and then measure interaction process for differences. Questions that need an answer are: Do particular types of group activities facilitate the establishment of a group's interaction patterns? Quality of interaction? Would groups trained by an N.T.L. trainer become more established in terms of interaction process variables, than groups left to their own devices for a comparable period of time? Do groups that have been trained by a facilitator remain established, in terms of interaction process variables, for a longer period of time, than groups who have been left to their own devices to become established?

Fourth, when a group becomes established in terms of temporal development (time) is still not known. Groups in the present study were considered to be established after 7.50 hours of in-group activity. In other studies, groups were considered to be established after 25 minutes (Fisher, 1970); 9 hours (Psathas, 1960); and 50 hours (Hall and Williams, 1966). Research needs to be conducted that compares ad hoc and established groups, and varies the amount of temporal development of the established groups. For example, compare 10 ad hoc groups with: 10 groups who have had 10 hours of temporal development, 10 groups who have had 20 hours temporal development, and 10 groups who have had 30 hours of temporal development.

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Table 1

SUMMARY OF t TEST RESULTS COMPARING
INTERACTION PATTERNS IN AD HOC AND ESTABLISHED GROUPS

	Mean	Variance	t Score
Feedback Responses			
Established Groups	6.88	16.43	.92
Ad Hoc Groups	8.00	20.83	
Person to Group Contributions			
Established Groups	5.08	11.27	.56
Ad Hoc Groups	5.74	22.92	
Total Contributions			
Established Groups	11.96	32.44	.94
Ad Hoc Groups	13.74	57.89	
Receive-Send Ratio			
Established Groups	.52	.08	.53
Ad Hoc Groups	.57	.09	
Selectivity Ratio			
Established Groups	1.57	1.79	.02
Ad Hoc Groups	1.56	1.95	
Centrality Index			
Established Groups	.46	.07	.007
Ad Hoc Groups	.45	.11	

Table 2

SUMMARY OF 216 MANN-WHITNEY U TESTS COMPARING
EACH ESTABLISHED GROUP WITH EACH AD HOC
GROUP FOR THE SIX INTERACTION PATTERNS

SUMMARY OF U SCORES:
COMPARISON OF ESTABLISHED #1
WITH 6 AD HOC GROUPS

Ad Hoc Group #	1	2	3	4	5	6
Feedback Sent	6.5	6.5	7.5	1.5	1.5	5.5
Person to Group	10	6	5	5	6	7
Total Contributions	10	3.5	5.5	9	3	10.5
Receive-send Ratio	11	15	7	6.5	9	10
Selectivity Ratio	5	5	7.5	1*	8	7.5
Centrality Index	10	16	10.5	9	2	11

(*significant at .05)

SUMMARY OF U SCORES:
COMPARISON OF ESTABLISHED #2
WITH 6 AD HOC GROUPS

Ad Hoc Group #	1	2	3	4	5	6
Feedback Sent	7	9	9	11.5	9	11
Person to Group	.5*	16	.5*	9.5	0*	.5*
Total Contributions	4.5	17.5	3	6	9	9
Receive-send Ratio	11	9.5	13	10	6	12
Selectivity Ratio	11	6	10	12	4.5	13
Centrality Index	6	15	11	11	10	10

(*significant at .05)

SUMMARY OF U SCORES:
COMPARISON OF ESTABLISHED #3
WITH 6 AD HOC GROUPS

Ad Hoc Group #	1	2	3	4	5	6
Feedback Sent	4.5	2*	7.5	3.5	8.5	9.5
Person to Group	4	1.5*	1.5	7	2.5	6.5
Total Contributions	7	.5*	6	6.5	2	6
Receive-send Ratio	5.5	12	5	5.5	1	7.5
Selectivity Ratio	4	3	7	1	3	7
Centrality Index	7	7	6	4	3	7

(*significant at .05)

SUMMARY OF U SCORES:
COMPARISON OF ESTABLISHED #4
WITH 6 AD HOC GROUPS

Ad Hoc Group #	1	2	3	4	5	6
Feedback Sent	4	0*	7	4	8	12
Person to Group	6.5	11.5	3	1	8	11.5
Total Contributions	1.5	1.5*	4	6	2.5	10
Receive-send Ratio	8	14	10	7	4	10
Selectivity Ratio	5.5	2*	3	5	1	12
Centrality Index	8	15	11	5.5	4	11.5

(*significant at .05)

SUMMARY OF U SCORES:
COMPARISON OF ESTABLISHED #5
WITH 6 AD HOC GROUPS

Ad Hoc Group #	1	2	3	4	5	6
Feedback Sent	4	3.5	9	6	7.5	9.5
Person to Group	7	7.5	3.5	5.5	5.5	7
Total Contributions	5.5	4	3.5	7	7	7.5
Receive-send Ratio	6.5	13	10	8	4	8
Selectivity Ratio	6.5	3	7	4	3.5	7
Dentrality Index	7	13	7	7	3	7

SUMMARY OF U SCORES:
COMPARISON OF ESTABLISHED #6
WITH 6 AD HOC GROUPS

Ad Hoc Group #	1	2	3	4	5	6
Feedback Sent	0*	5.5	6	5	0	1.5
Person to Group	8	2*	4	4	4	4
Total Contributions	0*	6	4	7	0	4
Receive-send Ratio	4	11.5	5	6.5	2	7.5
Selectivity Ratio	1.5	12	6	0*	6	2
Centrality Index	4	14	4	4	1.5	6

(* significant at .05)